PPP case study: Increasing the ecological relevance of chemical risk assessments using geospatial approaches

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Abstract (2,500 character limit, including spaces):

This poster and its companion surfactant case study poster provide the foundation for the similarly titled platform presentation. Review of these posters prior to viewing the platform will provide helpful background information.

A key rationale for making geo-referenced chemical risk assessment is that it provides assessments that can be tailored to local landscape/watershed abiotic characteristics and ecology to account for spatial heterogeneity within river basins. Since heterogeneity is often reflected in localised specific environmental objectives and protection goals, spatially explicit assessments can better relate to landscape/watershed scale environmental management objectives than can current generic chemical environmental risk assessment frameworks. In 2017 ECETOC initiated a Task Force to investigate current capabilities in making spatially explicit chemical risk assessment (from both an exposure and effects perspective). After comprehensive research for applicable and available data, we investigated techniques and methods for combining disparate data sets using 2 case studies and identified some of the challenges of using different levels of taxonomic, spatial and temporal resolution in geo-referenced risk assessments. The results of our case studies give an indication of the potential value of making geo-referenced chemical risk assessments as well as the limitations to current capability. In this plant protection product (PPP) case study located in the German State of Hessen, georeferenced aquatic exposures were generated from the SYNOPS model using surveyed usage data randomly applied to >80 000 fields utilizing standard regulatory exposure modeling. We focused on 3 winter cereals and 3 PPPs commonly used on these crops (insecticide, herbicide and fungicide). Daily aggregate exposure-toxicity ratios (ETRs) were generated for 3 acute and 5 chronic endpoints across the PPPs for each field over a one-year period. The 90th percentile of 1 and 7 day ETRs for each field were assigned to the closest stream segment within 300m. Biological monitoring data (linked to the same stream dataset) obtained from local authorities was used to determine the ecological state for algae, macrophytes, macroinvertebrates and fish. Biomonitoring data and ETRs were spatially associated by stream segment and analyzed. This poster will present the source data, processing methods, and results from three levels of relating georeferenced exposure and biomonitoring data.